

Serial No. 10/507,470
Applicant: Mohr et al.
Second Preliminary Amendment dated March 7, 2005
Attorney Docket No.: 7-4217

Amendment to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1-56. (canceled)

57. (new) An apparatus for exposing a culture having a surface to a gaseous medium, the apparatus comprising:

a housing configured to house a culture within the housing;

a flow duct to direct a flow of gaseous medium to a culture in the housing; and

the flow duct comprising an outflow opening disposed above the surface of the culture when a culture is in the housing, the outflow opening comprising an inner surface opening in a trumpetlike configuration in the direction of flow.

58. (new) The apparatus of claim 57 wherein the inner surface is hyperboloid-shaped and is rotationally symmetrical about an axis.

59. (new) The apparatus of claim 57 wherein the outflow opening comprises a minimum cross-section area and an outer rim, the rim spaced from the surface of the culture when a culture is in the housing; and

the rim and the surface of the culture define an annular flow passage therebetween, the flow passage having a cross-section area less than the minimum cross-section area of the outflow opening.

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60. (new) The apparatus of claim 57 wherein the outflow opening is configured to be spaced a separation distance from the surface of the culture when a culture is in the housing and the apparatus comprises means for selectively adjusting the separation distance.

61. (new) The apparatus of claim 57 wherein the housing comprises a wall enclosing a recess to receive a culture container having an inner side wall;

the outflow opening comprises a minimum cross section area and an outer rim in the recess; and

the inner side wall and the rim define an annular gap therebetween, the gap having a cross-section flow area greater than the minimum cross section area of the outflow opening.

62. (new) The apparatus of claim 57 wherein the housing comprises a chamber to house a culture;

the flow duct discharges into the chamber to flow gaseous medium to a culture housed in the chamber; and

the housing comprises a vacuum line and a vacuum port, the vacuum line extending from the chamber to the vacuum port, the vacuum port being configured to be fluidly connected to a source of vacuum whereby gaseous medium discharged from the flow duct into the chamber flows out of the chamber through the vacuum line.

63. (new) The apparatus of claim 62 wherein the housing comprises a bore wall and an annular orifice, the bore wall

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defining a bore extending into the housing to the chamber, the flow duct at least partially in the bore, the bore and the chamber extending along a common axis;

the annular orifice in the bore surrounding the flow duct, the annular orifice forming a substantially airtight seal between the flow duct and the bore wall and dividing the bore into upstream and downstream portions; and

the vacuum line comprises a plurality of passages through the annular orifice fluidly communicating the upstream and downstream bore portions, the passages being arranged symmetrically about the axis.

64. (new) The apparatus of claim 63 provided with a plurality of annular orifices, each annular orifice having a different cross-section passage area, whereby suction generated through the vacuum line can be selectively adjusted by selectively inserting one of the plurality of different annular orifices into the apparatus.

65. (new) The apparatus of claim 57 comprising at least one of the following (a), (b), (c) and (d):

- (a) means for measuring the flow rate of the gaseous medium;
- (b) means for regulating the temperature of gaseous medium discharged from the flow duct;
- (c) a heating device in the flow duct to regulate the temperature of gaseous medium discharged from the flow duct; and

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(d) a flow meter configured to measure the flow rate of the gaseous medium, a flow rate adjusting valve operatively connected to the flow duct to selectively adjust the flow rate of the gaseous medium through the flow duct, and a connection between the flow meter and the flow rate adjusting valve wherein the flow rate adjusted by the flow rate adjusting valve is a function of the flow rate measured by the flow meter.

66. (new) The apparatus of claim 57 wherein the housing comprises a plurality of chambers, each chamber configured to house a respective culture container;

the flow duct comprises a plurality of flow ducts, each flow duct associated with a respective chamber to flow gaseous medium to a container housed in the chamber; and

the apparatus comprises a suction fitting and a plurality of flow lines, the suction fitting configured to be attached to a supply of the gaseous medium, each flow line extending from the suction fitting to a respective chamber; whereby the supply of gaseous medium is fluidly connected to each chamber.

67. (new) The apparatus of claim 57 wherein the housing comprises an upper part, a lower part, and a connection separably joining the upper and lower parts;

the flow duct is mounted in the upper part; and

the lower part comprises a recess to house a culture and means for regulating the temperature of a culture housed in the recess, the recess having an open end when the lower part is

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separated from the upper part whereby access to a culture is achieved by separating the upper and lower parts.

68. (new) The apparatus of claim 67 wherein the lower part comprises means for furnishing a liquid medium to a cell culture housed in the recess.

69 (new) The apparatus of claim 68 wherein the means for furnishing a liquid medium comprises at least one the following (a) and (b):

(a) means for submersible or basal supply of the liquid medium; and

(b) means for regulating the temperature of the liquid medium.

70. (new) The apparatus of claim 67 wherein the lower part recess is configured to house a container holding a prokaryotic culture; and

the apparatus comprises an ejection apparatus attached to the lower part, the ejection apparatus being actuatable to engage a container in the recess to eject the container from the apparatus.

71. (new) An apparatus for exposing a culture having a surface to a gaseous medium, the apparatus comprising:

a housing configured to house a culture within the housing;

an apparatus for flowing gaseous medium into the housing;

a flow line in the housing to flow gaseous medium to the culture;

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the flow line comprising a suction opening to receive the gaseous medium from a supply of the gaseous medium and an outflow opening disposed above the surface of the culture when a culture is in the housing;

the suction opening comprising an inner surface opening in a trumpetlike configuration opposite the direction of flow through the flow line.

72. (new) The apparatus of claim 71 wherein the inner surface is hyperboloid-shaped and is rotationally symmetric about an axis.

73. (new) The apparatus of claim 71 wherein the suction opening is covered by a gas-permeable cover formed from a foamed material of large porosity.

74. (new) The apparatus of claim 71 wherein the flow line comprises a plurality of outlet openings and a plurality of branch lines, the branch lines fluidly connecting the suction opening and the plurality of outlet openings whereby flow of gaseous medium through the flow line divides into a plurality of flow paths.

75. (new) The apparatus of claim 74 wherein the flow line comprises a guide section between the suction opening and the plurality of branch lines, the guide section comprising a cylindrical inner surface extending along an axis, and each branch line extends radially away from the guide section.

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76. (new) The apparatus of claim 74 wherein the flow line comprises a guide section between the suction opening and the plurality of branch lines, the guide section comprising a cylindrical inner surface extending along a first axis, and each branch line extends along a respective second axis substantially parallel with the first axis.

77. (new) The apparatus of claim 74 wherein the flow line comprises a guide section and a plurality of guide vanes in the guide section;

the guide section between the suction opening and the plurality of branch lines, the vanes arranged to separate suction spaces in the guide section, each suction space fluidly connected with a respective branch line, wherein the guide vanes are configured to generate substantially equal suction in each suction space.

78. (new) A construction kit for the assembly of at least one of a cell culture/exposure apparatus and a prokaryotic culture/exposure apparatus for exposing a culture to a gaseous medium, the kit capable of constructing a plurality of different culture/exposure apparatus, the construction kit comprising:

at least one of first and second upper parts; and

at least one of first and second lower parts;

each upper part configured to cooperate with each lower part to form a culture/exposure apparatus by selecting one lower part and one upper part;

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each lower part comprising an upper side and a recess open on the upper side, the recess configured to receive a culture;

the first lower part being configured to house a prokaryotic culture;

the second lower part being configured to house a cell culture, and comprising means for supplying nutrients to the cell culture in the recess;

each upper part comprising an upper side, a lower side that faces the upper side of the one lower part when forming a culture/exposure apparatus, and a flow duct to direct a flow of a gaseous medium to a culture, the flow duct comprising an outflow opening on the lower side that opens into the recess of the one lower part when forming a culture/exposure apparatus;

the outflow opening of the first upper part comprising an inner surface opening in a trumpetlike configuration in the direction of flow.

79. (new) A method for the culture and exposure of prokaryotes comprising the steps of:

(a) providing a housing comprising a chamber, an inlet, an outlet, a first flow line fluidly connecting the inlet and the chamber to flow gaseous medium into the chamber, and a second flow line fluidly connecting the outlet and the chamber;

(b) placing a culture of prokaryotes into the chamber;

(c) connecting the inlet to a source of gaseous medium; and

(d) connecting the outlet to a source of vacuum,

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whereby the vacuum is fluidly connected to the inlet and induces flow of gaseous medium through the chamber to expose the culture of prokaryotes to the flow of gaseous medium.

80. (new) A culture/exposure apparatus for exposing prokaryotes to a gaseous medium, the apparatus comprising a housing, the housing comprising a chamber to house a culture of prokaryotes, a first flow duct in the housing to be connected to a source of gaseous medium, the first flow duct extending from an suction opening to the chamber to flow gaseous medium over a culture of prokaryotes housed within the chamber.